

Algebra 2 · Radians and the Unit Circle · Test

Common Core F-TF.A.1, F-TF.A.2, F-TF.C.8 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This 45-minute test has 9 questions worth 20 points on radian measure, the unit circle, exact trigonometric values and the Pythagorean identity. Give exact answers unless a decimal is requested. A calculator is allowed for decimals only.

Test information

- **Grade:** Algebra 2
- **Chapter:** Radians and the Unit Circle
- **Common Core:** F-TF.A.1, F-TF.A.2, F-TF.C.8
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 2 pts; Question 5: 2 pts; Question 6: 2 pts; Question 7: 2 pts; Question 8: 3 pts; Question 9: 3 pts)

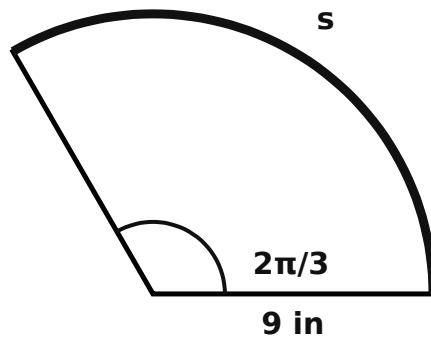
Question 1: Converting angle measures (2 points)

Complete each conversion.

- Write 150° in radians, in terms of π . (1 point)
- Write $\frac{7\pi}{4}$ radians in degrees. (1 point)

Question 2: Arc length and angle (2 points)

A sector has radius 9 inches and central angle $\frac{2\pi}{3}$.

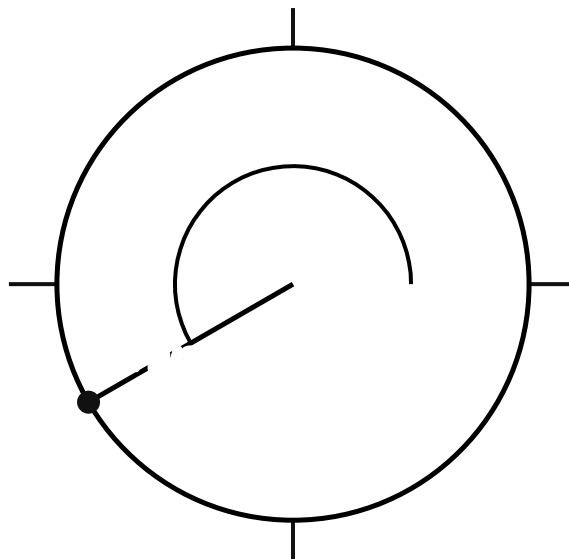


The sector and its arc s .

- Find the exact arc length. (1 point)
- On a different circle of radius 8 inches, an arc is 12 inches long. Find its central angle in radians. (1 point)

Question 3: Point on the unit circle (2 points)

The terminal side of an angle of $\frac{7\pi}{6}$ radians is shown.



Angle $\frac{7\pi}{6}$ in standard position.

Find the exact coordinates of the point where it meets the unit circle. (2 points)

Question 4: Exact sine and cosine (2 points)

Find the exact value of each.

a. $\sin \frac{5\pi}{3}$ (1 point)

b. $\cos \frac{3\pi}{4}$ (1 point)

Question 5: Tangent values (2 points)

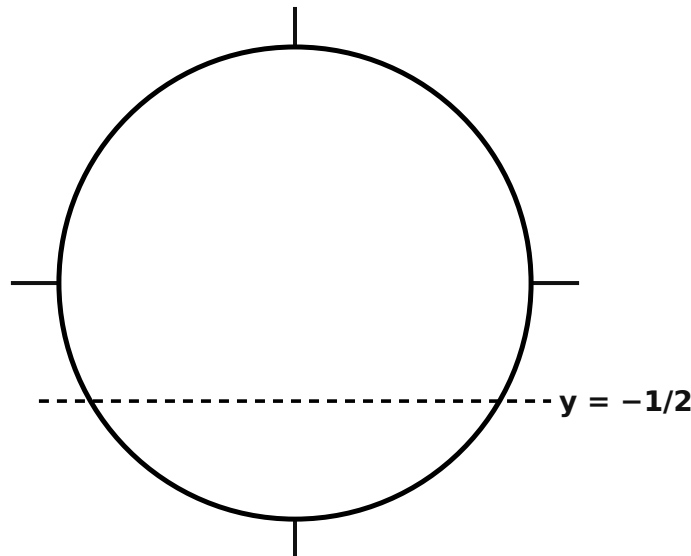
Find the exact value of each.

a. $\tan \frac{7\pi}{4}$ (1 point)

b. $\tan \frac{2\pi}{3}$ (1 point)

Question 6: Solving a sine equation (2 points)

Find all angles θ with $0 \leq \theta < 2\pi$ such that $\sin \theta = -\frac{1}{2}$.



The line $y = -\frac{1}{2}$ crosses the unit circle twice.

Question 7: Sine and tangent from cosine (2 points)

The terminal side of θ is in Quadrant II and $\cos \theta = -\frac{12}{13}$.

a. Find $\sin \theta$. (1 point)

b. Find $\tan \theta$. (1 point)

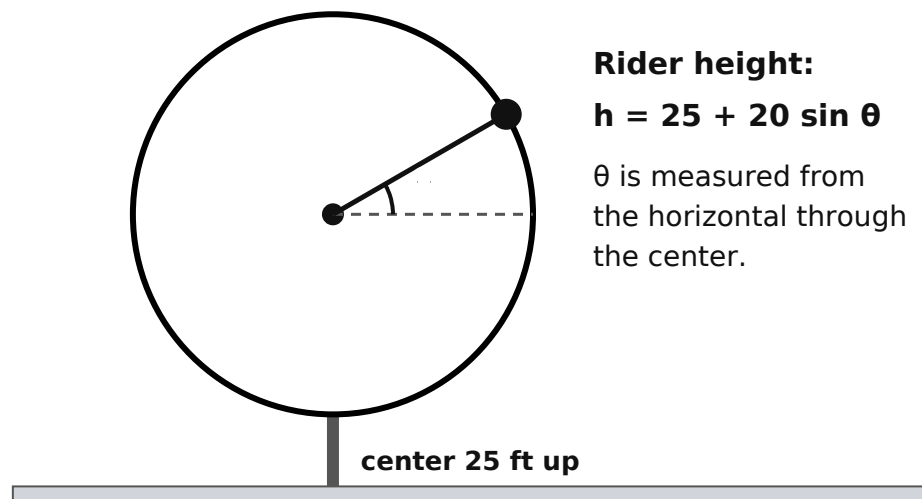
Question 8: Using symmetry (3 points)

The angle θ satisfies $\pi < \theta < \frac{3\pi}{2}$ and $\sin \theta = -\frac{4}{5}$.

- a. Find $\cos \theta$. (1 point)
- b. Find $\tan \theta$. (1 point)
- c. Find $\sin(-\theta)$ and $\cos(-\theta)$. (1 point)

Question 9: Ferris wheel (3 points)

A Ferris wheel has radius 20 feet and center 25 feet above the ground. A rider's height is $h = 25 + 20 \sin \theta$ feet.



The wheel and the rider angle θ .

- a. Find h when $\theta = \frac{\pi}{6}$. (1 point)
- b. Find h when $\theta = \frac{4\pi}{3}$ to the nearest hundredth. (1 point)
- c. Find all θ with $0 \leq \theta < 2\pi$ for which $h = 15$. (1 point)